

J.M. CANTY

PROCESS TECHNOLOGY

Canty Fuseview™ vs. Metal Glass Sight Glasses

Fused vs. CON-fused

Canty Fuseview™

Metal Glass Sight Glass

Size

View

View area matches the connection size. When you order a 4" window you get a 4" view!

Reduced view! Resulting up to a 65% loss in viewable area compared to Fuseview™

Vessel Costs

Full view eliminates unseen material inside the nozzle.

Reduced view essentially requires a 6" nozzle rather than a 4" nozzle for an equivalent view.

[Fuseview™ Advantage](#)

Materials of Construction

[Fuseview™ View comparison](#)

[View illustration sheet](#)

Metal

Hastelloy® C, C276, and C-22®

Duplex Stainless Steel

Corrosion

Excellent corrosion resistance of high nickel alloys to a wide variety of chemical process environments, including strong oxidizing and reducing media. Excellent resistance to localized corrosion. Designed to be used where "upset" conditions are likely to occur or in multipurpose plants. Excellent resistance to pitting and stress corrosion cracking.

Developed for salt water and chloride applications. However, contains only half the nickel of 316L which is a key inhibitor for chemical attack. So when used in a pharmaceutical or chemical process where chemical attack is the issue it doesn't have the nickel which makes 316L and high nickel alloys like Hastelloy® perform so well. It is a mistake to compare Duplex to 316L in only one category of stress corrosion cracking compared to the wide range of conditions 316L sees. With the lower nickel content it would require testing to confirm its application

[Material Comparison chart](#)

Expansion

Maximum view diameter due to the excellent thermal properties of Hastelloy®.

Smaller view due to the poor thermal properties of Duplex stainless steel.

Glass

Boro Plus™

Borosilicate

Strength

Boro Plus™ is superior to other glass with ideal optical and fusing properties. It readily fuses to steel making a one piece hermetically sealed window capable of high pressures and temperatures.

Poor fusing properties of Borosilicate leads to cracking of the glass. It is generally recommend against fusing Borosilicate as it does not readily wet to some metals, it will crack and fail. Press fitting is the best that can be done on a repeatable basis.

Thermal Shock

Boro Plus™ has excellent thermal shock resistance. It is an ideal match with the steel allowing for a 250° C operating and 200°C minimum thermal shock differential with no cracking.

Poor match between Duplex and Borosilicate glass leads to poor thermal shock resistance. CIP and SIP often cause stress cracks in the glass which they deem acceptable and do not warrantee.

Chemical Resistance

Equal to or exceeds Borosilicate. Boro Plus™ glass is similar to the composition of glass lined reactors which has been used for several decades. Most suitable for pharmaceutical and chemical use.

Borosilicate glass is not recommended for fusing or for manufacturing of glass steel reactors (Pfaudler and De Dietrich). Does not have suitable abrasion, impact, fusion, and thermal shock properties that Boro Plus™ has. The coefficient of expansion is too high to fuse without edge cracking.

Glass-Metal Interface

True fusion of glass to metal is achieved when there is molecular diffusion. A coarse looking surface at the interface is an indication of this fusion. A smooth, clean looking surface at the interface generally indicates fusion has not taken place. Proper fusion between the glass and metal creates an intermediate layer of molecular structure which allows for a strong, hermetic seal. In general, when fusion does not occur the glass/metal surface appears to be press-fit together with no apparent diffusive bonding of materials, and indeed testing indicates this to be the case. Units that feature a fusion of the glass to metal are approximately 50% stronger than those lacking fusion. Therefore the Fuseview™ is produced with the stronger fuse.

Sight glasses do not visually exhibit typical characteristics of proper fusion. What appears to be a press-fit sight glass actually is as demonstrated by the destructive test pictured in the following image hyperlinked below. This condition, among other factors, reduces the integrity of the assembly and leads to problems when subjected to thermal cycling and higher pressure loads.

[Fused vs. Unfused windows](#)

Impact Strength

Superior strength from optimum materials and fusing process.

Reduced impact resistance due to poorly match materials and unfused seals.

Pressure Resistance

Maximum operating pressures from precisely matched materials and hermetically sealed fuse.

Lower pressure ratings due to unfused windows and poor materials. Compensated for with thicker windows with smaller views.



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